CONTENTS

Preface vii

Sponsors ix

Committees x

ELECTRONS ON LIQUID HELIUM AND 2D WIGNER CRYSTALS

Phase diagrams and melting in a screened two-dimensional system: electrons on helium films
H.-W. Jiang, M.A. Stan and A.J. Dahm 1

Melting and transport properties of two-dimensional Wigner crystals on liquid He
M. Saitoh 8

Specific and latent heat of the 2D electron solid
D.C. Glattli, E.Y. Andrei and F.I.B. Williams 17

Cyclotron resonance of the 2D electron crystal
L. Wilen and R. Giannetta 24

Nonlinear transport phenomena of crystallized electrons formed on liquid helium film
K. Kajita 29

The search for crystallization of a two-dimensional pool of ions trapped below the surface of superfluid ^{4}He
C.J. Mellor, C.M. Muirhead, J. Traverse and W.F. Vinen 33

Escape rates of electrons from the surface of liquid helium
J.M. Goodkind, G.F. Saville, A.E. Ruckenstein and P.M. Platzman 38

CONDUCTANCE FLUCTUATIONS AND QUASI-ONE-DIMENSIONAL TRANSPORT

Conductance fluctuations in small devices
P.A. Lee 43

Magneto-quantum transport in a quasi-one-dimensional GaAs/Al_xGa_{1-x}As ring
A.M. Chang, G. Timp, T.Y. Chang, J.E. Cunningham, B. Chelluri, P.M. Mankiewich, R.E. Behringer and R.E. Howard 46

Universal conductance fluctuations in the magnetoresistance of submicron-size n^+-GaAs wires and laterally confined n^--GaAs/(AlGa)As heterostructures
R.P. Taylor, M.L. Leadbeater, G.P. Whittington, P.C. Main, L. Eaves, S.P. Beaumont, I. McIntyre, S. Thoms and C.D.W. Wilkinson 52

Quantum transport in narrow Si accumulation layers
D. Pooke, R. Mottahedeh, M. Pepper and A. Gundlach 59

Quantum transport in one-dimensional GaAs/AlGaAs microstructures
G. Timp, A.M. Chang, P. deVegvar, R.E. Howard, R. Behringer, J.E. Cunningham and P. Mankiewich 68

Transport in ultra-narrow quantum well wires
M.L. Roukes, A. Scherer, H.G. Craighead, S.J. Allen, Jr., R.M. Ruthen, E.D. Beebe and J.P. Harbison 79

Quantum interference effects in high-mobility mesoscopic GaAs/$Al_xGa_{1-x}As$ heterostructures
J.A. Simmons, D.C. Tsui and G. Weimann 81

Aspects of transport properties of quasi-one-dimensional electron systems
X.C. Xie and S. Das Sarma 89

Structure in the rectifying behavior of mesoscopic Si MOSFETs
S.B. Kaplan 93

Quasi-one-dimensional electron states in a split-gate GaAs/AlGaAs heterostructure
S.E. Laux, D.J. Frank and F. Stern 101

LOCALIZATION

Localisation in the quantum Hall regime
H. Aoki 107

Localization in two-dimensional square lattices: effects of magnetic field and spin–orbit interaction
T. Ando 120

On the fractal dimensionality of the extended states in disordered two-dimensional systems in a strong magnetic field
B. Kramer, Y. Ono and T. Ohtsuki 127

Magnetic field effects in strongly localized quasi-1D MOSFETs
J.J. Wainer, A.B. Fowler and R.A. Webb 134

Numerical and percolation studies of Ohmic variable-range hopping in 1D
P.N. Butcher and J.A. McInnes 139

Boundary scattering modified one-dimensional weak localization in submicron GaAs/AlGaAs heterostructures
H. van Houten, C.W.J. Beenakker, B.J. van Wees and J.E. Mooij 144

Localization effects in a non-degenerate 2DEG
P.W. Adams and M.A. Paalanen 150

INTEGRAL QUANTUM HALL EFFECT

Breakdown of dissipationless quantum Hall conduction in narrow channels
L. Bliek, G. Hein, D. Jucknischke, V. Kose, J. Niemeyer, G. Weimann and W. Schlapp 156

Narrow channel breakdown in GaAs/AlGaAs heterostructures
M. D'Iorio, A.S. Sachrajda, D. Landheer, M. Buchanan, T. Moore, C.J. Miner and A.J. Springthorpe 165

Complex scattering dynamics and the integral quantum Hall effect
S.A. Trugman and F.R. Waugh 171

The intrinsic plateau width and the effect of the sample boundaries on the integral quantum Hall effect in GaAs/AlGaAs
R. Meisels, F. Kuchar, K.Y. Lim, G. Weimann and W. Schlapp 177

Low frequency noise in the integral quantum Hall effect
B.E. Kane, D.C. Tsui and G. Weimann 183

Experiments and theory on the quantum Hall effect with inhomogeneous electron density
R. Woltjer 188

FRACTIONAL QUANTUM HALL EFFECT

Optical measurements of Landau level density of states and Coulomb gaps under FQHE in Si MOSFET
I.V. Kukushkin and V.B. Timofeev 196

Magneto-optics of the fractional quantum Hall effect
B.B. Goldberg, D. Heiman, A. Pinczuk, C.W. Tu, A.C. Gossard and J.H. English 209

Experimental tests of fractional quantum Hall effect theory
R.G. Clark, J.R. Mallett, A. Usher, A.M. Suckling, R.J. Nicholas, S.R. Haynes, Y. Journaux, J.J. Harris and C.T. Foxon 219

Effects of the gate bias on the activation energies of the fractional quantum Hall effect
J. Wakabayashi, S. Sudou, S. Kawaji, K. Hirakawa and H. Sakaki 236

The influence of a tilted magnetic field on the fractional quantum Hall effect and the exchange enhancement of the spin splitting
R.J. Haug, K. von Klitzing, R.J. Nicholas, J.C. Maan and G. Weimann 242

Fractional quantum Hall effect in tilted magnetic fields
D.A. Syphers and J.E. Furneaux 252

Fractional quantum Hall effect in extremely high mobility GaAs/(AlGa)As heterostructures
R. Willett, H.L. Stormer, D.C. Tsui, A.C. Gossard, J.H. English and K.W. Baldwin 257

CYCLOTRON RESONANCE

Effects of the filling factor on the cyclotron resonance in gated AlGaAs/GaAs heterostructures
K. Ensslin, D. Heitmann, H. Sigg and K. Ploog 263

Cyclotron resonance of electrons in Si n-inversion layers at low densities: many-body effects or localization?
J.-P. Cheng, N.C. Jarosik, B.D. McCombe and K.C. Woo 268

Cyclotron masses of inversion electrons in tilted magnetic fields
S. Oelting, A.D. Wieck, E. Batke and U. Merkt 273

Cyclotron resonance in the extreme quantum limit
M.J. Chou, D.C. Tsui and G. Weimann 279

MAGNETOTRANSPORT

Magnetotransport and cyclotron resonance in AlAs quantum wells
T.P. Smith III, W.I. Wang, F.F. Fang, L.L. Chang, L.S. Kim, T. Pham and H.D. Drew 287

Magnetotransport and cyclotron resonance investigations of the 2D electron gas in e^--beam irradiated AlGaAs/GaAs heterojunctions
H. Sigg, D. Weiss and K. von Klitzing 293

Fundamental high-field transport properties of a GaAs/AlGaAs modulation doped heterostructure
M. Chmielowski, M. Gliński, W.H. Zhuang, G.B. Liang, D.Z. Sun, M.Y. Kong, W. Plesiewicz, T. Dietl and T. Skośkiewicz 299

Nanosecond far infra red magnetospectroscopy of GaAs/AlGaAs heterostructures
G.L.J.A. Rikken, P. Wyder, K. Ploog, J.M. Chamberlain, R.T. Grimes and G. Hill 303

Landau-level broadening and scattering time in modulation doped GaAs/AlGaAs heterostructures
F.F. Fang, T.P. Smith III and S.L. Wright 310

Effects of higher subband tails on inelastic scattering time in Si(001) inversion layers
S. Kawaji and N. Nagashima 316

Quantum lifetime measurements of the two-dimensional electron gas at the inverted AlGaAs/GaAs interface
K.P. Martin, R.J. Higgins, J.J.L. Rascol, H. Yoo and J.R. Arthur 323

Density of states in a two-dimensional hole gas in high magnetic fields
A. Waag, W. Heuring, G. Remenyi, G. Landwehr, E. Bangert, G. Weimann and W. Schlapp 328

EFFECTS OF IMPURITIES AND INTERFACE ROUGHNESS

Barrier impurity states in modulation doped AlGaAs/GaAs multi-quantum wells
J.-M. Mercy, B.D. McCombe, W. Beard, J. Ralston and G. Wicks 334

Evidence for impurity states close to the 2D gas in GaAs/GaAlAs heterostructures
E. Gornik, W. Seidenbusch, R. Christanell, R. Lassnig and C.R. Pidgeon 339

Impurity bands and band tails in accumulation and inversion layers
A. Ghazali, A. Gold and J. Serre 346

Density of states of electrons bound to impurities in quantum wells of GaAlAs/GaAs
E.A. de Andrada e Silva, I.C. da Cunha Lima, A. Ferreira da Silva and C.E. Leal 352

Theory of electronic impurity states associated with primed subbands of inversion layers in silicon MOSFETs
G.M. Kramer and R.F. Wallis 355

A spectroscopic study of screening effects in a quasi-two-dimensional system
D. Gammon, E. Glaser, B.V. Shanabrook and D. Musser 359

Interface roughness in AlAs/GaAs quantum wells characterized by the mobility of two-dimensional electrons
K. Hirakawa, T. Noda and H. Sakaki 365

TUNNELING AND VERTICAL TRANSPORT

Tunneling study of GaAs/GaAlAs heterostructures
R. Lassnig, J. Smoliner, W. Boxleitner and E. Gornik 367

Tunneling study of mixed electric and magnetic subbands on Si(001) surfaces
U. Kunze 374

Elastic and inelastic tunneling in multiple quantum well structures
B. Movaghar, J. Leo and A. MacKinnon 381

Determination of carrier mobility for Bloch transport in superlattice minibands
B. Deveaud, J. Shah, T.C. Damen, A. Regreny and B. Lambert 386

Photoluminescence and photoluminescence excitation study of electron–hole tunneling in $In_{0.53}Ga_{0.47}As/InP$ coupled-single quantum wells
R. Sauer, T.D. Harris and W.T. Tsang 388

Tunneling in AlGaAs by Γ–X scattering
P.J. Price 394

Time-resolved photoluminescence measurement of carrier trapping time of InGaAs/InP quantum wells
D.J. Westland, D. Mihailovič, J.F. Ryan and M.D. Scott 399

Evidence for sequential tunnelling and charge build-up in double barrier resonant tunnelling devices
C.A. Payling, E.S. Alves, L. Eaves, T.J. Foster, M. Henini, O.H. Hughes, P.E. Simmonds, F.W. Sheard, G.A. Toombs and J.C. Portal 404

PHONON PHENOMENA

Magnetic field dependence of the phonon scattering and phonon emission by a 2DEG in a Si MOSFET
A.J. Kent, V.W. Rampton, M.I. Newton, P.J.A. Carter, G.A. Hardy, P. Hawker, P.A. Russell and L.J. Challis 410

Quantum oscillations in a mechanical resonator containing a two-dimensional electron system
P.L. Gammel, D.J. Bishop, J.P. Eisenstein, R.P. Hall, H.L. Stormer, A.C. Gossard and J.H. English 417

A new resonance phenomenon associated with electron transitions in superlattices and single quantum wells
M. Babiker, M.P. Chamberlain, A. Ghosal and B.K. Ridley 422

Cyclotron resonance of electrons in a narrow GaAs/(Ga,Al)As quantum well: polaron effects and non-parabolicity
J. Singleton, R.J. Nicholas, D.C. Rogers and C.T.B. Foxon 429

Polaron cyclotron mass in $GaAs/Al_xGa_{1-x}As$ heterostructures
F.M. Peeters, Wu Xiaoguang and J.T. Devreese 437

Thermal conductance magneto-oscillations and electron–phonon coupling in GaAs/AlGaAs heterostructures
J.P. Eisenstein, A.C. Gossard and V. Narayanamurti 445

Competition between LO and TO phonon scattering in GaAs/GaAlAs heterojunctions
M.A. Brummell, D.R. Leadley, R.J. Nicholas, J.J. Harris and C.T. Foxon 451

Electron–interface-phonon interaction in GaAs/AlAs and InAs/GaSb heterojunctions
M.H. Degani and O. Hipólito 459

COLLECTIVE EXCITATIONS AND MANY-BODY EFFECTS

Elementary collective excitations in multilayered two-dimensional systems
J.K. Jain and S. Das Sarma 466

Plasmon mechanism for superconductivity in semiconducting heterostructures: the effect of acoustic plasmons
G.F. Giuliani 476

Electron self-energy, effective mass and lifetime in a layered electron gas
P. Hawrylak, G. Eliasson and J.J. Quinn 482

Density correlation function of a superlattice with wave function overlap
R.Q. Yang, X.J. Lu, X.L. Lei, L.M. Xie and C.H. Tsai 487

Edge electron states in charged two-dimensional systems
V.B. Shikin and I. Nachev 494

Low frequency collective excitations in the quantum-Hall system
E.Y. Andrei, D.C. Glattli, F.I.B. Williams and M. Heiblum 501

Fermi energy edge singularity in luminescence spectra from modulation-doped quantum wells
M.S. Skolnick, J.M. Rorison, K.J. Nash and S.J. Bass 507

Optical properties of one-side modulation-doped quantum wells
J.A. Brum, J. Orgonasi, G. Bastard, C. Delalande, M. Voos, G. Weimann and W. Schlapp 512

MAGNETO-OPTICAL PHENOMENA

Magneto-optical properties of superlattices and quantum wells
J.C. Maan 518

Theory of magneto-excitons in quantum wells
S.-R. Eric Yang and L.J. Sham 533

Magneto-optics of n- and p-type modulation-doped GaAs/$Al_xGa_{1-x}As$ quantum wells
J.S. Lee, N. Miura and Y. Iwasa 534

Magnetic hole levels in quantum wells in a parallel field
M. Altarelli and G. Platero 540

Oscillator strengths of interband magneto-optical transitions in strained-layer heterostructures
J.A. Brum, P. Voisin, M. Voos, L.L. Chang and L. Esaki 545

Theory of magneto-optical properties in narrow-gap semiconductor quantum wells
S. Lamari and L.J. Sham 551

EXCITONS IN ZERO, ONE, AND TWO DIMENSIONS

Exciton localisation in quantum well structures
J. Hegarty and M.D. Sturge 555

Localized quantum well excitons in the high magnetic field limit
J.E. Zucker, E. Isaacs, D. Heiman, A. Pinczuk and D.S. Chemla 563

Spectroscopic studies of excitonic fine structure under electric fields
L. Viña 569

Study of electric field effects on the electronic structure of quantum wells by resonant Raman scattering
J.M. Calleja, C. López, C. Tejedor, L. Viña, E.E. Méndez, W.I. Wang, M. Staines and M. Cardona 578

Optical investigation of 2D Mott transitions in GaAs/GaAlAs quantum well structures
G. Tränkle, E. Lach, M. Walther, A. Forchel and G. Weimann 584

Enhanced excitonic optical nonlinearity and exciton dynamics in semiconductor microstructures
T. Takagahara 590

Excitons in quantum boxes
G.W. Bryant 596

INTERSUBBAND TRANSITIONS IN ONE- AND TWO-DIMENSIONAL STRUCTURES

Intersubband resonances in quasi-one-dimensional channels
J.P. Kotthaus, W. Hansen, H. Pohlmann, M. Wassermeier and K. Ploog 600

Picosecond studies of intersubband relaxation in semiconductor quantum wells
D.Y. Oberli, D.R. Wake, M.V. Klein, T. Henderson and H. Morkoç 611

Electronic excitations in narrow GaAs/$Al_xGa_{1-x}As$ quantum well structures
G. Abstreiter, T. Egeler, S. Beeck, A. Seilmeier, H.J. Hübner, G. Weimann and W. Schlapp 613

Inelastic light scattering of valence subband transitions in GaAs/GaAlAs multiple quantum wells
B.B. Goldberg, D. Heiman, A. Pinczuk and A.C. Gossard 619

Observation of coupled quasi-two-dimensional electronic excitations in tilted magnetic fields
R. Borroff, R. Merlin, R.L. Greene and J. Comas 626

SEMIMAGNETIC AND II–VI SEMICONDUCTOR HETEROSTRUCTURES

Quasi-two-dimensional excitons in selected II–VI compound semiconductor superlattices: the case of a small valence band offset
A.V. Nurmikko 632

Ultrathin magnetic layers in semiconductor superlattices
U. Gummich, G.G. Cabrera and C.E.T. Gonçalves da Silva 643

Dimensional dependence of magnetic susceptibility in dilute magnetic semiconductor superlattices
D.D. Awschalom, G. Grinstein, J. Yoshino, H. Munekata and L.L. Chang 649

Spin fluctuations and magnetic polaron formation in dilute magnetic semiconductor quantum well structures
S.A. Jackson 654

Bound magnetic polaron in semimagnetic semiconductor heterostructures
G.E. Marques, V.A. Chitta, M.H. Degani and O. Hipólito 659

Electronic properties of HgTe/HgCdTe heterojunctions
K.C. Woo, S. Rafol and J.P. Faurie 665

Two-dimensional electron gas in HgCdTe/CdTe heterostructures
G.S. Boebinger, Y. Guldner, J.P. Vieren, M. Voos and J.P. Faurie 669

MISCELLANEOUS STRUCTURES, STUDIES, AND TECHNIQUES

Subband physics for a "realistic" δ-doping layer
A. Zrenner, F. Koch and K. Ploog 671

Magneto-optical studies of a silicon delta-doping layer in n-GaAs
C.H. Perry, K.S. Lee, W. Zhou, J.M. Worlock, A. Zrenner, F. Koch and K. Ploog 677

Strained type II superlattices
D.L. Smith and C. Mailhiot 683

Magnetic-field-induced transitions in InAs/$Ga_{1-x}Al_xSb$ heterostructures
T.P. Smith III, H. Munekata, L.L. Chang, F.F. Fang and L. Esaki 687

Connection rule of envelope functions at heterointerface
H. Akera, S. Wakahara and T. Ando 694

Variation of thermopower of two-dimensional electrons in GaAs and InGaAs at low temperatures
P.K. Basu, C.K. Sarkar and S. Kundu 700

Landau gap in a two-dimensional hole gas
R.S. Markiewicz, M. Meskoob and B. Maheswaran 707

Electrochemical potential oscillations of the two-dimensional electron gas in GaAs/AlGaAs heterostructures in high magnetic fields
A.M. Dabiran, R.T. Zeller, F.F. Fang, S.L. Wright and P.J. Stiles 712

Nonequilibrium charge spreading in two-dimensional electron systems
A.V. Chaplik and A.O. Govorov 719

Author index 720

Subject index 732